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APPLICATION FOR LETTERS PATENT

for

ISOMETRIC EXERCISE EQUIPMENT WITH PORTABLE FEEDBACK DEVICE

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FIELD OF THE INVENTION

The present invention relates generally to exercising apparatuses, and in particular to isometric exercising apparatuses used in conjunction with feedback devices in order to manage the timing of users' exercising or physical therapy regimens in order to maximize results.

BACKGROUND OF INVENTION

In the area of exercise, there are various methods and apparatuses known in the art with the purpose of building muscle. In particular, isometric exercises are those in which a force is applied, by a muscle group of an individual exerciser, to a resistant object for a brief period of time in order to strengthen and build muscle mass. The resistant object may be a bar mounted to stationary supports as disclosed, for example, in U.S. Pat. Nos. 3,424,005 and 5,776,037.

The isometric exercise apparatuses known in the art cannot resist the muscular force applied by users during their body's strongest range of motion, as required for static contraction training, without the need for added weights or supports. Isometrics is from the Latin Iso – Same, Metric – distance, meaning the same distance between motion. In 1999 a new form of training called Static Contraction Training (and published in a book by the same name) produced a particularly effective refinement to the then state of the art of isometric training. Static contraction training is a method of periodic isometric training known in the art that uses zero range of motion of the body with the heaviest weights.

In the invention, disclosed herein, the need for added weights presents many safety issues such as injury occurring when placing weight on the apparatus, and apparatus failure when the user applies greater force then normal apparatus resistance. Furthermore, the need to add weights or supports creates transportation difficulty and increases preparation time before exercising.

Other means of resistance employed by exercising apparatuses, such as hydraulic circuits as disclosed in U.S. Pat. No. 5,924,965, have lower durability and higher production cost causing the total cost of the exercising apparatus to increase.

Exercising apparatuses have also been developed to include feedback devices to evaluate the characteristics of exercises performed by users as disclosed, for example, in U.S. Pat. No. 4,647,039. However, these exercising apparatuses do not assist a user in determining the optimal period to perform isometric exercises. Furthermore, the feedback devices known in the art are not portable and cannot be used with other compatible isometric exercise apparatuses.

For these reasons, in order to reach full potential when utilizing isometric exercises, an apparatus is needed that is capable of resisting a force exerted during the user's strongest range of bodily motion, as known in the art, without added weights or supports, and a method of monitoring is also needed in order to determine when to perform isometric exercise.

SUMMARY OF THE INVENTION

It is the first object of the present invention to provide an apparatus that can resist the user's muscular force applied during the strongest range of motion.

Another object of the present invention is to provide a method to determine the optimal period to perform isometric exercises.

The isometric exerciser of the present invention includes a rigid bar, which is securable on both ends to a chain or other positioning means by a pin or other securing contrivance, thus allowing a user to position the bar at a desired height and position. The positioning means is further attached on opposite ends to a frame allowing the user to apply force to the bar without disturbing the position.

The apparatus is coupled with a portable feedback device that may be used with multiple apparatuses, which measures and displays strain, or other characteristic, indicating the magnitude of force during use. Subsequent to an exercise, the portable feedback device displays and stores the maximum magnitude of force achieved for user comparison or calculation. A code, insertable card, or other means for identification may be included in the portable feedback device in order to retrieve past information recorded by the device for a specific user to further automate the scheduling of workouts.

The present invention provides a method for exercising in order to build muscle mass or rehabilitate injuries to tendons and ligaments. The method comprises the steps of exerting a muscular force on the apparatus for a brief period of time, increasing the level of force slowly only to the point of the onset of the slightest subjective feeling of pain. This force is applied in a very slowly increased manner and is stopped, and the muscle relaxed at the slightest onset of pain. This has the dual benefit of giving the user a safe

feedback into the pain point of the injury, and of stimulating increased recovery in a safe manner. The measuring and recording said force, abstaining from exercise for a predetermined period derived from the recorded force, and adding additional time to the exercising abstention period when successive forces decrease or go unchanged. The following results illustrate employment of the method in rehabilitative manner for a user with a recent hip replacement. The user, who started with the ability to generate 850 lbs of force in the uninjured limb, obtained the following results:

Workout 1: 18 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 2: 157 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 3: 348 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 4: 585 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 5: 720 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 6: 900 lbs of force and no pain feeling.

At this point the joint was fully healed and the user was able to run 5 miles. This recovery was fully 6 times as fast as a good recovery for a similar injury, demonstrating the utility of the application. The fact that a utility of that nature it is not now commonplace further illustrates the need for this method of exercise and rehabilitation.

These and other features, aspects and advantages of the present invention will become better understood with reference to the following description, claims, and accompanying drawings. Therefore, the form of the invention, as set out above, should be considered illustrative and not as limiting the scope of the following claims.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a front view of an embodiment of the apparatus and portable feedback device.

FIG. 2 is a front view of a second embodiment of the apparatus and portable feedback device.

DESCRIPTION OF THE INVENTION

The present invention represents an apparatus that can withstand a high level resistance in combination with a portable feedback device. One embodiment is displayed in **Fig. 1**. A support structure includes a frame **1** that is a configuration of supports made of metal of high stress capacity that is well known in the art of metal composition. Two front vertical supports of the frame **1** extend upward from a base **2**. Two bottom supports of the frame **1** extend rearward horizontally from the base and intersect at their rear ends. A vertical back support of the frame **1** extends upward from the intersection of the two bottom supports. Two top supports of the frame **1** extend horizontally forward from the back vertical support and intersect with the two front vertical supports.

A user engageable member **3** shown in **Fig. 1** is composed of metal of high stress capacity that is well known in the art of metal composition. Each end of the user engageable member **3** is attached to a chain **5** as a means for securing the user engageable member **3** to the frame **1** in the desired position of the user. The user engageable member **3** is secured to the chain **5** by a pin-fastener **4** that has one end that extends through both the user engageable member **3** and a link in the chain **5** and a second end that extends on the outside of a link in the chain **5** and user engageable member **3**, therefore compressing the user engageable member **3** against the link of the chain **5**. The chain **5** is further attached to a pulley system **6** in order to distribute the force applied to the user engageable member **3** to the frame **1** as a part of the support structure of the apparatus, and in order for a transportable feedback device **7** to be connected to the apparatus and detect the force applied by the user to the user engageable member **3**.

The portable feedback device **7** is an electromechanical gauge that detects, displays and stores the maximum strain applied to the sensor that is connected to the portable feedback device **7** via a cable **8** that is attached to the pulley system **6**. Electromechanical gauges that detect, display and store strain are well known in the art.

A second embodiment is displayed in **Fig. 2**. A support structure is made of metal of high stress capacity that is well known in the art of metal composition. A support structure has a bench **9** that has legs that rest on the ground. Adjacent to the bench **9** there are two vertical supports **10** on each side of the bench **9** that extend upward.

A user engageable member **11** shown in **Fig. 2** is composed of metal of high stress capacity as well known in the art of metal composition. The user engageable

member **11** has two perpendicular supports **12** extending perpendicularly from the user engageable member **11** into the supports **10** which are hollow on their top ends. The top ends of supports **10** receive the perpendicular supports **12** of the user engageable member **11** as a means for positioning the user engageable member **11**. There are holes in the hollow portion of the supports **10** and the perpendicular supports **12** of the user engageable member **11** in order for a pin **13** to pass through both the supports **10** and the perpendicular supports **12** as a means for securing the user engageable member **11** in the user's desired position.

The portable feedback device **7** is also compatible with the current embodiment displayed in **Fig. 2**. The cable **8** is attached to a pulley structure **14** that is further attached to the user engageable member **11**. In order for the portable feedback device **7** to detect, display and store strain the user exerts on the user engageable member **11,** the user's force is transferred through the pulley system **14** wherein the force is detected by the portable feedback device **7** through the cable **8**.

In addition, a method for exercising, in order to build muscle mass or rehabilitate injuries to tendons and ligaments, comprising the steps of exerting a muscular force on the user engageable member **3** is disclosed. The muscular force generates an isometric force starting muscle hypertrophy in order to build muscle mass. Muscle hypertrophy is the enlargement or overgrowth of muscle due to an increase in size of its constituent cells. In one embodiment, the user exerts a force using the strongest range of bodily motion at the greatest exertion level for ten seconds, or until muscles completely fatigue, whichever occurs first. Alternatively, the user slowly increases the exertion of force on the resistant apparatus until the user experiences the first onset of pain. The slow

increase of exertion assists in rehabilitating tendon and ligament injuries through muscle hypertrophy, and indicates the available range of motion of the injury. The force may be applied by any desired muscle group of the user's body, and in any position known in the art to utilize said desired muscle group.

The user measures the value of the maximum force achieved during the exertion through the portable feedback device **7**.

The user retains the value of the maximum force achieved during the exertion through a retaining means. The retaining means may be a means for memory in the portable feedback device **7**, or alternatively, manually recording the value of maximum force.

The user abstains from exercising the muscle group exerted in order to allow for muscle hypertrophy. The exercising abstention period is approximately five to seven days.

The user performs another exertion of the same muscle group in the same manner of the previous exertion.

The user measures the value of the maximum force achieved during the second exertion through the portable feedback device **7**.

The user retains the value of the maximum force achieved during the second exertion through a retaining means. The retaining means may be a means for memory in the portable feedback device, or alternatively, manually recording the value of maximum force.

The user increases the abstention period between exertions when the value of the current measured maximum force is lower or unchanged then the value of the maximum force of an immediately prior exertion.

The user abstains from exercising the muscle group exerted in order to allow for muscle hypertrophy. The exercising abstention period is approximately five to seven days.

As a user repeats the method over time, the user accumulates muscle growth, or injury rehabilitation, and the period of abstention for the muscle group exercised increases.

A typical example use from a recent hip replacement in a 31 year old male subject who started with the ability to generate 850 lbs of force in the uninjured limb, and began the exercise upon learning of the technique having made hardly any gains in 4 months of previous conventional physical therapy.

Workout 1: 18 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 2: 157 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 3: 348 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 4: 585 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 5: 720 lbs of force prior to the onset of pain

2 weeks of abstention

Workout 6: 900 lbs of force and no pain feeling.

At this point the joint was fully healed and the user was able to run 5 miles. This recovery was fully 6 times as fast as a good recovery for a similar injury, demonstrating the utility of the application. His doctor (unaware of the rehab approach he was using) was so impressed as to have been showing his X-Rays at universities as an unexplainable anomaly of rehab success. The fact that a utility of that nature it is not now commonplace further illustrates the non-obviousness of the procedure.

Another typical example of a user using the machine to increase his leg strength (for hypertrophy instead of recovery) had the following results.

Workout 1: pressed 1100 lbs

Abstained for 2 weeks

Workout 2: pressed 1454 lbs

Abstained for 2 weeks

Workout 3: pressed 1785 lbs

Abstained for 2 weeks

Workout 4: pressed only 1545 lbs Since this was less than the previous 1785 lbs the user now abstained for 3 weeks instead of 2.

Abstain for 3 weeks

Workout 5: pressed 1932 lbs

Abstained for 3 weeks (Note: once the time between workouts has risen, it stays at the higher level)

Workout 6: pressed 2300 lbs

Shortly after workout 6 the user, a 33 year old male, performed a slam dunk for the first time in his life.

The modification of this methodology for rehabilitation has never been disclosed, or published prior to this application. But the utility of the efficacy of the method of are such a character (cutting a rehabilitation time from 12 months to 2 months) as to strongly indicate its novelty.